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SUBJECT: Black Pearl - The Threat of Water Pollution to Guangdong's Future

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¶1. (SBU) Summary: The following is neither an overstatement nor is it hyperbole. It is a fact. The contaminated waters of the Pearl River and other water sources in Guangdong are as serious a threat to the region's health and economic sustainability as the decline in exports, the closure of small and medium enterprises and the increasing utilization of land for nonproductive reasons. According to one study, more than ten percent of drinking water sources in the province failed to meet Chinese standards -- 24 percent in Guangzhou alone; local experts say these figures likely underestimate the severity of the problem. Only about 50 percent of Guangzhou's sewage is treated. Government efforts to ensure safe drinking water and minimize health related incidents fall well short as they do not adequately address elevated levels of contamination for organic compounds, nitrogen, pesticide residues, heavy metals and other toxic substances. Water must be piped long distances because closer resources are too contaminated, oft-times the result of waste discharge being close to drinking water plants. Smaller rivers and Pearl River tributaries are especially vulnerable and groundwater and river sediment are highly contaminated. While it is hard to assess the impact of water pollution on human health here, it is clear that local residents in some heavily polluted areas are already displaying the effects including cancers, bone diseases and other disorders stemming from exposure to high levels of arsenic, cadmium and other toxins. Serious steps are needed to address these looming health issues, but no comprehensive strategy has yet been devised. End summary.

An Abundant Resource, Heavily Abused

¶2. (U) Water is plentiful in the Pearl River Delta (PRD). The delta is formed by the confluence of three major rivers which run into the South China Sea, with an average annual water flow of about 336.2 billion cubic meters. The area is also rich in rainfall, with annual precipitation of 1600-2200 millimeters.

¶3. (U) However, after 30 years of rapid development and population growth, water quality has dramatically deteriorated. Agriculture, mining, logging, shipping and household waste have all taken their

toll, but industrial waste has been particularly devastating. Many small, inefficient factories are spread out geographically, which means pollution is widespread and hard to control or mitigate. According to one report, there are 18,300 petrochemical factories in Guangzhou and 70% of them are located around the Pearl River. About 6,000 of them discharge more than 100 tons of waste water annually. Zhang Hongou, Director of the Guangzhou Institute of Geography, has predicted that pollution will lead to a drinking water shortage of 1.8 billion cubic meters (or 32 percent of demand) in Guangdong by 2010.

Even Official Data Show Severity of Problem

14. (SBU) Officially released studies confirm that the level of water contamination in the Pearl River system is alarming. According to a 2007 provincial government report on the state of Guangdong environmental protection, more than ten percent of monitoring samples taken from drinking water sources in the Pearl River Delta failed to meet the Chinese government's standards for acceptable levels of contamination. Guangzhou and Shenzhen had the highest percentages among Guangdong cities of samples that failed to meet Chinese standards at 24% and 17% respectively. Another study, not limited to drinking water sources, showed that samples from 35% of 111 sections of major rivers in Guangdong were polluted. Among them, 12.6, 8.1 and 14.4 percent were mildly, moderately and heavily polluted, respectively. For Guangdong as a whole, monitoring data from major river estuaries leading to the South China Sea indicated that 42.7% were polluted. According to an expert familiar with the monitoring system, water pollution data in the PRD would reflect more severe contamination if the monitoring sites were more

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representative and if more pollutants were analyzed.

Major Pollutants - Sewage, Heavy Metals, Fertilizer

15. (SBU) According to a Guangzhou municipal government report, the city's total waste water discharge in 2007 was about 6.9 billion tons with 64.4% from residential sewage. Only about 50% of the city's sewage is treated. The discharges of organic compounds as measured by chemical oxygen demand (COD), nitrogen, industrial toxic substances (volatile phenols, cyanide, arsenic, lead, mercury, cadmium and chromium) and petroleum compounds were 1,017,300; 120,000; 53 and 367 tons, respectively. (Note: Measurements of pollution are often treated as state secrets, and one knowledgeable contact told us that these figures are too low. End note.) Pesticide pollution and eutrophication are also serious problems due to abusive application of the pesticides and chemical fertilizers in agriculture. Agriculture accounts for 70% of nitrogen pollution and 50% of phosphorous pollution in the PRD. Nitrate, nitrite, heavy metals and polycyclic aromatic hydrocarbons (PAHs) pollution are all high. A 1999 Zhongshan University study of heavy metal concentrations in muscle tissue of fish in three different Pearl River Delta estuaries showed that 45, 50 and 44 percent of samples exceeded Chinese standards for zinc, lead and arsenic, respectively.

Drinking Water - Government Efforts Failing So Far

16. (U) Governments at various levels in Guangdong have pledged to ensure the quality of drinking water in the province, but their efforts have not succeeded due to widespread of contamination of soil, local rivers and other surface waters and the continuous discharge of the industrial and residential waste water. On October 28, 2008, following an inspection of drinking water facilities, Wang Yang, Guangdong's Party Secretary, said that he would make sure that people had clean water to drink. During the inspection, Zhang Hu, Director of the Guangdong Department of Water Management, acknowledged that the west channel of the Pearl River - the drinking water source for the Shimen water plant that was the site of the visit - was polluted with domestic sewage, industrial waste water and chemical fertilizers.

17. (SBU) According to Pan Dalin, vice director of the Environment and Resource Protection Committee of the Guangdong People's Congress, many cities have to spend large amounts of money to get water from faraway locations because sources closer in are too heavily polluted. For example, because of heavy contamination in the section of the Pearl River that runs through Guangzhou, the city pipes in water from the Shunde channel and the Dongjiang River more than 10 kilometers away. Guangdong Department of Water Management officials told us that water quality is regularly monitored by various measures and treated to make sure drinking water is safe. But they admitted that this is only applied effectively at the large drinking water plants in Guangzhou. The officials also said that they must resort to using polluted sources during droughts and other water shortages. In 2008, in the Zhong Luotan area of Guangzhou, 41 residents suffered severe nitrite poisoning symptoms because drinking water was contaminated by industrial waster water.

18. (U) Efforts to ensure safe drinking water outside of Guangdong's major cities also fall short. As in Zhong Luotan, 128 residents of Yangjiang Municipality in southern Guangdong exhibited nausea, vomiting and other symptoms in 2008 due to nitrite contamination in drinking water. In Chikan town, in nearby Jiangmen Municipality, untreated waste water discharge from a factory with an electroplating workshop forced the closure of a drinking water plant in 2008. Water had to be trucked in for 50,000 residents for five days. The factory's waste discharge outlet was just 100 meters away from the inlet of the drinking water plant.

19. (U) In addition to chronic sources of water pollution, industrial accidents and other environmental incidents have repeatedly caused severe levels of contamination in drinking water sources. One researcher found that among 28 (officially-reported) drinking water contamination incidents in China between 2001 and 2008, six occurred

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in Guangdong. Examples of recent incidents include the following:

--In September 2008, 20-30 tons of fish in the Liuxi River in Guangzhou municipality died due to water contamination. According to government monitoring data, water quality of the Liuxi River, a major source for drinking water, meets Chinese standards. According to local residents, large numbers of dead fish can be found in this section of the river three to four times per year. Many residents blame industrial pollution from upstream factories.

-- In 2005, a government-owned lead and zinc smelter, the third largest in China, illegally discharged cadmium-contaminated wastewater into the Beijiang River during "an overhaul of equipment." The contamination increased concentrations of cadmium in the drinking water source for thousands of residents to more than 10 times the Chinese national standard for drinking water.

Smaller Rivers - Vulnerable and Suffering

10. (SBU) Smaller rivers and Pearl River tributaries are particularly vulnerable because lower water flow levels mean pollution is less easily diluted. In addition to the Pearl River, there are 231 smaller rivers in Guangzhou Municipality with a combined length of 913 kilometers. Due to untreated industrial and residential waste, many are badly polluted with black discoloration, foul odors and thick sediment that often contain toxic chemicals. The municipal government has acknowledged this problem and allotted more than USD 250 million to clean up 69 rivers totaling 121 kilometers in length. However, Zhao Sun, vice director of the Guangzhou Department of Water Resources told us that water quality measurements of rivers that are targeted by the program had shown basically no improvement, even though the city had built four waste water treatment plants and laid 763 kilometers of sewage pipes since 1997. One contact said the program had been hampered by corruption and pointed out that wastewater discharge was still high.

11. (U) The mayor of Guangzhou, Zhang Guangning, has announced a major effort to clean up the heavily polluted rivers ahead of the Guangzhou-hosted 2010 Asia Games. The city will reportedly budget USD 5.8 billion for water resource management. Zhang said he would

hold party secretaries and other district-level top officials responsible for cleaning up the rivers, announcing that they would swim in local rivers, just as he himself swims across the Pearl River every year to show its improved water quality. (Note: Zhang did acknowledge that this year's swim was in waters more polluted than in previous years, though he did not offer any explanation why. End Note.)

¶12. (U) Some examples of smaller rivers with particularly serious levels of contamination include:

--The Shijing River - On October 22, 2008, local media reported that deep-black water stretching for several kilometers from the Shijing River had flowed into the Pearl River, emitting a foul odor as the stronger currents of the Pearl stirred up the contaminated sediment in the Shijing. Local residents complained that this phenomenon had occurred many times over the last two years.

--The Guanlan and Shima Rivers - Local residents call the Guanlan River in Shenzhen and Shima River in Dongguan the black dragon rivers due to discoloration from industrial and residential waste. Zhang Lijun, former vice minister of China's State Environmental Protection Administration (forerunner of the Ministry of Environmental Protection), was reportedly shocked by the scale and magnitude of pollution in the two rivers on a January 2007 trip to Dongguan to inspect emissions. Even after mitigation efforts lasting several years and costing billions of renminbi, water quality in the two rivers is still poor. The rivers' flows into the Dongjiang River had to be disrupted to prevent pollutants from contaminating an important source of the drinking water for Guangzhou, Hong Kong and other cities.

--The Hengshui River - Researchers from South China Agricultural University in Guangzhou reported that even after diluting samples from the Hengshui River by a factor of 10,000, contamination was

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still too high for aquatic life to survive in it for more than 24 hours. During periods of heavy rainfall, the toxic waters of the Hengshui extend as far as 100 to 200 kilometers downstream. Under normal river-flow conditions, polluted waters typically extend nearly 50 kilometers downstream.

Groundwater Contaminated Too

¶13. (U) A 2006 survey by the Chinese Academy of Geological Sciences' Institute of Hydrogeology and Environmental Geology determined that groundwater in the PRD is also contaminated with heavy metals, organic chemicals, volatile phenols, nitrate, pesticides and other pollutants. The problem is more severe near industrial zones and heavily polluted rivers. One report from a Guangdong research institute indicated that lead concentrations of up to 0.15 parts per million (PPM) have been found in the province's well water. This is at least 15 times the level permitted by China's drinking water standards.

Sediment - What's Left Behind

¶14. (U) The sediment underneath Guangdong's polluted surface waters has also shown extremely high concentrations of heavy metals, PAHs, pesticides and other pollutants. One study of sediments in 18 smaller rivers in Guangzhou showed that average concentrations for arsenic, cadmium, mercury, lead, and chromium were 24.7, 3.0, 0.7, 121.3, and 104.4, mg/kg respectively. The average concentrations of arsenic and cadmium were 9 and 53 times higher than background concentrations. The maximum concentrations identified in the study samples were 34.7 mg/kg for arsenic and 4.8 mg/kg for cadmium. In comparison, a 2008 EPA proposal to address arsenic-tainted soil in Minnesota called for clean-up of all soil with concentrations higher than 25 mg/kg. These river sediments are still used in some areas as organic fertilizers leading the further soil contamination. Clean-up of contaminated sediment is particularly challenging; in the PRD it would take years and large amounts of resources.

Future Mitigation Programs Face Obstacles

¶15. (U) Some senior officials in Guangdong appreciate the severity of water pollution in the province and are serious about taking measures to reduce it. Party Secretary Wang Yang's economic strategy for the province -- the "double transfer" policy -- is aimed in part at controlling environmental pollution. Overall, the "double transfer" policy seeks to move labor-intensive, less efficient and heavily polluting industries out of the Pearl River Delta to less developed parts of Guangdong Province to make room for high-tech, high value-added and service industries. As heavily polluting enterprises are moved, the government claims it will try to collocate them in special zones to make monitoring and mitigation easier and more efficient. Some of these types of zones have already been established (ref B).

¶16. (SBU) However, many local experts believe water pollution will continue to be a severe problem in the PRD for the near- and medium-term despite such efforts due to the following factors:

- Large number of inefficient factories.
- High percentage (50%) of residential sewage discharged without treatment.
- Low efficiency of existing sewage treatment facilities.
- Corruption among environmental monitoring officials.
- High levels of soil contamination that will continue to migrate into to water sources (ref A)
- Sediment contamination will continue to affect surface water even if other sources of pollution are mitigated.
- Solid industrial waste which will continue to migrate into water sources, especially after flooding.
- Low level of commitment from local officials focused on near term results
- Continuing high levels of pollution from agricultural pesticide and chemical fertilizer run-off.
- Lack of openness with environmental data.

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A Critical Challenge for Guangdong

¶17. (SBU) Comment: Drinking water is a major pathway for many pollutants and thus water pollution is a critical factor in human cumulative exposure to harmful chemicals. Because there are no comprehensive studies of cumulative exposure in the PRD, it's hard to assess the impact of water pollution on human health here. But it's clear that, for the population of the PRD and elsewhere in Guangdong, water pollution is greatly increasing human exposure to many harmful pollutants such as heavy metals, PAHs and pesticide residues. In addition, the polluted water will further contaminate soil, vegetables, livestock and seafood through irrigation, flooding and food chains, leading to even higher cumulative exposure. Local residents in some heavily polluted areas already display serious health effects, including cancers, bone diseases, and water poisoning from arsenic, cadmium and other toxins. Further studies would likely reveal more long-term effects. This problem will only worsen as economic and population growth continue if major action is not taken to address this serious threat to health and economic sustainability in Guangdong. End comment.

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